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BENEFIT-COST ANALYSIS OF ACTIVITIES AT THE PORT OF SAINT JOHN

FINAL REPORT

Prepared for:

Department of Commerce and Technology
Province of New Brunswick

November 13, 1986

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November 13, 1986 86-0533-01/1.1

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RE: Benefit-Cost Analysis of the Port of Saint John

Dear Mr. Wheatley:

Please find enclosed herewith the final report regarding our analysis of the above topic.

We thank you for the opportunity of assisting you with this evaluation.

Yours truly,

Allan Fiander, P. Eng.
President

ADF/rc

Enclosures

cc. Micheal MacBride

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1.0 INTRODUCTION

This report presents the results of a benefit-cost study of various activities at the Port of Saint John. It should be emphasized that the report has been prepared from the perspective of the Province of New Brunswick. The study reviews the social benefits realized by the Province as a result of employment at the Port. As well, the cost savings to New Brunswick companies presently shipping cargo outbound or receiving cargo inbound through the Port are estimated. The benefits to the Province as a result of property tax payments by owners and lessees of port related facilities is quantified, and a range of other benefits are considered. The present and projected social benefits are then compared to the present and projected social costs incurred by the Province over the 1986 - 1996 period. All benefits and costs are expressed in terms of 1986 constant dollars, and the projected values of future benefits and costs are discounted to their present values using a commonly accepted social discount rate of 10 percent.

An outline of the contents of the report according to specific chapters is as follows:

Chapter 2.0 - Presents a brief overview of the study findings.

Chapter 3.0 - Presents a review of overall employment in port related activities.

Chapter 4.0 - Estimates the social benefits to the Province associated with employment at the Port.

Chapter 5.0 - Estimates the benefits to New Brunswick companies shipping cargo outbound through the Port.

Chapter 6.0 - Estimates the benefits to New Brunswick companies receiving cargo inbound through the Port.

Chapter 7.0 - Discusses a range of other benefits including property taxes, motive fuel taxes, and the impact of the Port on Provincial economic development.

Chapter 8.0 - Discusses the costs to the Province associated with port related activities.

Chapter 9.0 - Presents a benefit-cost analysis from the Provincial government perspective.

Chapter 10.0 - Presents a summary of several sensitivity analyses conducted.

2.0 SUMMARY AND CONCLUSIONS

1). An extensive telephone survey of firms and government agencies providing port related services was conducted in order to solicit information regarding the present level of employment provided by direct activities associated with the Port of Saint John. Based on this survey it is estimated that port related activities provide a total of 1 328 direct jobs and annual wages of $38.7 million.

It should be noted that the present level of employment represents a 44 percent decline since the estimates of employment were prepared as part of the preparation of the Port Masterplan[1] in 1977. The reduction in employment at the Port is much more startling when compared to the optimistic projections of 4 000 direct jobs at the facility in 1990 contained in the Masterplan[2].

2). The present value of the employment benefits associated with the jobs at the Port over the period 1986 - 1996 is projected to be $83.1 million. This is considered a conservative estimate of the employment benefits resulting from Port activities, since it is based on the benefits of direct employment only.

3). Many New Brunswick companies derive considerable cost savings by shipping their outbound cargo through the Port of Saint John. It is estimated that if these New Brunswick companies were forced to use the closest alternative port facility (Halifax or Quebec City), their annual transportation costs for outbound cargo shipments would increase by $22.1 million per year. Chief beneficiaries included companies shipping pulp and paper products (wood pulp, paper, paperboard and newsprint) who realize 74 percent of total benefits. Other major beneficiaries include potash and salt producers in the Sussex area who realize 7.3 percent of benefits, and lumber producers

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1 Fenco Consultants Ltd., Decade of the Eighties - Master Plan for Port of Saint John, study prepared for N.B. Dept. of Commerce and Development, Federal Dept. of Regional Economic Expansion, and Port of Saint John, December, 1979, p. 5.6.

2 Ibid; Figure 5.2 Economic Impact 1977 and 1990.

located throughout various parts of the Province who realize 3.6 percent of the transportation cost savings. The present value of these annual transportation cost savings over the 1986 - 1996 period is projected to be $158.1 million.

4). New Brunswick companies importing cargo from foreign markets (and Nova Scotia via the Digby - Saint John ferry service) realize substantial cost savings by having their cargo delivered through the Port of Saint John. It is estimated that the increased costs to New Brunswick companies of receiving these inbound commodity movements through the closest feasible alternative port (generally Halifax or Quebec City) would represent $5.3 million per year. Chief beneficiaries of these transportation cost savings on inbound commodity shipments include: Atlantic Sugar (47 percent of total), which would likely close if ready access to port facilities were not available; pulp and paper mills importing process chemicals (28 percent of total); miscellaneous companies receiving cargo via the Atlantic Marine ferry service between Digby and Saint John (10 percent of total); and Crosby Molasses receiving shipments of molasses from Barbados and the Dominican Republic (9 percent of total). The present value of these annual transportation cost savings to New Brunswick companies receiving cargo inbound through the Port of Saint John over the 1986 - 1996 period is projected to be $38.0 million.

It should be noted that no benefits have been included for the Irving companies receiving inbound shipments of petroleum products, as well as shipping outbound cargoes of refined petroleum products. It could be argued on the one extreme that without port facilities, the oil refinery would close and 425± jobs would be lost to the Province. On the other extreme, it could be argued that the Canaport type of mooring buoy system for handling petroleum products by means of pipeline to shore based facilities could be constructed at a nearby deep water location on the Bay of Fundy, if the Port of Saint John were unavailable.

5). The owned and leased wharves, warehouses, outdoor storage areas, offices, etc. at the Port of Saint John accounted for approximately $49.2 million in assessed value and contributed $2.2 million in property taxes to the Province during 1986. It is assumed that one-half of these taxes represent net benefits to the Province and City of Saint John in terms of revenue in excess of incremental municipal services costs necessitated by Port activities. As well, it is estimated that annual revenues of $716 000 accrue to the Province from Provincial sales taxes on purchases at the Port. The total present value of the benefits to the Province resulting from property taxes and sales taxes over the 1986 - 1996 period is projected to be $13.0 million.

6). Historically, the Port of Saint John has been managed and operated by the Government of Canada. Therefore, the Province of New Brunswick has not generally been involved with the costs or revenues associated with Port activities. The one major exception is the capital costs loaned to the Port for the construction of the Rodney Container Terminal (Brunterm). Over the 1972 - 1975 period a total of $25 192 638 in Provincial funds were committed to the construction of the container terminal. As of January, 1986, an outstanding principal balance of $19 681 252 remained unpaid to the Province. For benefit-cost analysis purposes, the $19.7 million was treated as an "up-front" capital cost by the Province as a result of its involvement in the Port. No other significant port related costs to the Province were identified.

7). In summary, the estimated total present value of benefits associated with the Port of Saint John over the 1986 - 1996 period is as follows:

employment benefits	- $ 83.1 million
outbound commodity shipper benefits	- 158.1 million
inbound commodity shipper benefits	- 38.0 million
property tax and sales tax benefits	- 13.0 million
TOTAL PRESENT VALUE OF BENEFITS	- $292.2 million

The estimated total present value of Provincial costs associated with the Port of Saint John over the 1986 - 1996 period is $19.7 million.

8). The benefit-cost analysis compared the total present value of benefits to the Province over the 1986 - 1996 period of $292.2 million to the total present value of costs of $19.7 million. The comparison of benefits and costs revealed a benefit/cost ratio of 14.83 and a positive net present value of benefits (benefits minus costs) of $272.5 million. These results strongly support the conclusion that the Province of New Brunswick derives substantial net benefits from the on-going operation of Port of Saint John facilities.

9). A sensitivity analysis confirmed that the net benefits to the Province resulting from port related activities are of sufficient magnitude that even under very pessimistic scenarios regarding the level of future benefits and costs, the benefits will still exceed the costs by a substantial margin.

10). Overall, the study results serve to highlight the important role of the Port of Saint John as regards the overall economic vitality of the Province of New Brunswick.

3.0 Review of Employment at the Port of Saint John

3.1 Introduction

A major activity conducted as part of the study involved an extensive data collection exercise undertaken in order to obtain up-to-date information on the levels of employment currently resulting from various port related activities.

It had been hoped that up-to-date information pertaining to levels of employment would be readily available for use by the Study Team in estimating the associated employment benefits. However, following commencement of data collection activities, it was found that no comprehensive listing of employment in port related activities had been assembled since 1977, when the latest Master Plan [1] for the Port was being prepared. Although the Master Plan study contains employment data for 1977, as well as projections for 1990 and the year 2000, it was considered unwise to rely on these estimates which are now nine years old, given a number of important changes in Port activities which have occurred since that time, and the relative importance of employment benefits in the overall scope of the benefit-cost analysis.

It was decided that the most cost-effective manner in which to collect this data would generally be by an intensive series of telephone calls to the many companies identified by Ports Canada officials as providing a service associated with port related activities.

3.2 Summary of Employment

The telephone survey involved approximately 80 telephone interviews. The resulting estimates of employment levels and earnings are summarized in Table 3.1. It is estimated that 1 328 persons are directly employed in port related activities. Collectively, the workers at the Port earned

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1 Fenco Consultants Ltd.; Decade of the Eighties, Master Plan for Port of Saint John, study prepared for N.B. Dept. of Commerce and Development, Federal Dept. of Regional Economic Expansion, and Port of Saint John; December, 1979.

Table 3.1

SUMMARY OF EMPLOYMENT AND EARNINGS AT
PORT OF SAINT JOHN
(PERSON-YEARS)

Employment Category	Person Years of Employment	Estimated Annual Wages ($ x 1000)
Stevedoring		
- Office Employees	72	1 728
- ILA Stevedores		
Local 273, Longshoremen	200	
Local 1039, Shipliners	23	9 183
Local 1720, Watchmen	0	
Local 1764, Checkers	56	
Towing Services	100	3 500
Ship Chandlers	30	600
Ship Repair and Maintenance	50	1 400
Warehousing	10	180
Rail Employees	89	2 974
Trucking Employees	N/A [1]	-----
Technical Services	10	350
Dredging	5	140
Pilotage	11	385
Specialty Services	10	300
Agencies, Ship Brokers, Ship Operators	159	4 770
Customs and Excise	38	1 064
Security Services	39	1 065
Insurance	2	50
Grain Handling (Maple Leaf Mills)	21	630
- includes ILA members of Local 1121 plus office staff		
Ports Canada	78	2 028
Department of Public Works	2	80
Transport Canada	21	630
Coast Guard	157	3 925
Marine Atlantic Inc. (Saint John area based - employees on Digby Ferry service)	145	3 712
TOTAL	1 328	38 694
AVERAGE WAGE	$29 137	
AVERAGE WAGE IN SAINT JOHN	$18 585	

[1] Trucking company employees as well as train crews dedicated to hauling cargo to and from the port have not been included since these jobs are considered indirect employment associated with the port.

wages totaling an estimated $38 694 000 during 1986. With average wages of $29 137, these Port workers had incomes 55.7 percent above the average earnings of all workers in the City of Saint John. The Port is obviously a major source of employment and generator of economic activity for the Province. However, it is apparent that the present level of employment is considerably lower than in some previous years. For example, during 1977, it was estimated that the direct employment at the Port amounted to 2 378 person-years[2].

The following sub-sections briefly comment on the major employment groups identified in Table 3.1.

3.2.1 Stevedoring

This group of employees includes two distinctly different elements. The first group consists of the office staff of the seven companies identified as providing stevedoring services. Essentially these companies handle most cargo passing through the Port with the exception of crude oil, petroleum products, and Marine Atlantic cargo associated with the Saint John - Digby ferry service. Ten companies were identified in the latest Port Directory as providing stevedoring services. However, the telephone survey revealed that only seven companies are actively providing these services for the Port of Saint John. Present employment by this group of companies is 72 person-years. This represents a large reduction from the 120 employees of 11 stevedoring companies during 1977[3].

In order to perform cargo handling services, the stevedoring companies hire members of the International Longshoremen's Association (ILA). Current information on stevedoring employment was obtained from the Manager, Maritime Employers Association. A summary for 1985 of the number of members, total manhours, and earnings for the four locals which fall under this Association is presented in Table 3.2. During 1985, the 444 ILA members falling under jurisdiction of the Maritime Employers Association worked a total of 446 500 hours and had total earnings of $9 183 000. With average earnings of $20.57 per hour and estimated

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2 Fenco Consultants Ltd.; Ibid, p. 5.6

3 Fenco Consultants Ltd.; Ibid, p. 4.8

Table 3.2

SUMMARY OF LONGSHOREMEN (ILA) EMPLOYMENT
AT PORT OF SAINT JOHN, 1985

Category	Number of Members	Number of Man-hours	Earnings
Local 273, Longshoremen	300	320 234	$6 500 048.84
Local 1039, Shipliners	50	37 315	865 780.58
Local 1720, Watchmen	12	65	727.51
Local 1764, Checkers	82	88 886	1 816 782.56
TOTAL	444	446 500	$9 183 339.49

Average Earnings = 9 183 339.49/446 500 = $20.57 per hour

Equivalent Person-Years
of Employment = 446 500/1 600[1] = 279 person-years

Estimated Average Annual Wages = $32 912 per person-year

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1 It is assumed that an average person year of employment for a stevedore is 1 600 working hours rather than the typical 1 800 - 1 900 working hours, since ILA members are on-call and the number of hours of work fluctuates dramatically with the volume of traffic passing through the port.

average annual wages of $32 912, the annual earnings of the stevedores was 86 percent higher than the Saint John average earnings for 1985 of $17 700[4]. The 446 500 hours worked by the stevedores during 1985 represents an equivalent of 279 person-years of employment.

A comparison of the number of members and the total hours worked by the ILA workforce at the Port of Saint John during the years 1969, 1977 and 1985 is presented in Table 3.3. It is evident that the level of employment has dropped successively over both the 1969 - 1977 and 1977 - 1985 periods. In fact the total hours worked by the stevedores in 1985 was only one-third the number of hours worked in 1969. The estimated number of person-years of employment in 1985 was 62 percent lower than in 1977 and 67 percent lower than in 1969. The reduction in manpower requirements has largely resulted from labour productivity having improved tremendously with the increased usage of containers and improved handling techniques for bulk commodities.

3.2.2 Towing and Environmental Services

Towing services are provided by Atlantic Towing Services. Although the company has a fleet of 22 tugs, only 6 tugs are primarily dedicated to service at the Port of Saint John. Others provide ocean, coastal and harbour towing, petroleum barging, dredging, salvage, and pollution control services to all North Atlantic shipping routes. According to company officials, approximately 100 person-years of employment are dedicated to operations dependent on the Port of Saint John. Pollution from oil-spills and related clean-up operations are normally provided by Atlantic Towing on an as-needed basis using company owned equipment. The Coast Guard owns more elaborate equipment which is made available if required for larger jobs.

3.2.3 Ship Chandlers

A total of four companies are presently providing employment for 30 persons in supplying various provisions for ships calling at the Port.

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4 The Financial Post; Canadian Markets 1985; p. 56

Table 3.3

COMPARISON OF ILA MEMBERSHIP
AND TOTAL HOURS WORKED IN VARIOUS YEARS

Category	Year			
	1969	1977	1985	% Change 1977-1985
Local 273, Longshoremen	1 150	650	300	-54%
Local 1039, Shipliners	80	66	50	-17%
Local 1720, Watchmen	85	32	12	-63%
Local 1764, Checkers	150	109	82	-25%
TOTAL	1 465	857	444	-48%
Total Hours Worked by Four Locals	1 372 000	1 177 000	446 500	-62%
Average Hours Worked per Member	937	1 373	1 006	-27%
Equivalent Person-Years of Employment[1]	858	736	279	-62%

[1]Based on 1 600 hours of employment by stevedores per person-year.

This compares to approximately 80 employees working for eight such companies in 1977.

3.2.4 Ship Repair and Maintenance

Four companies were listed in the Port directory as providing repairs, however, one firm said it is doing no work for the Port, another firm experienced only 2 - 3 person-weeks of work last year, and a third firm experienced 11 person-years of port related work. The major ship repair work has been provided by Saint John Shipbuilding Company Limited. For purposes of this study it was decided that only that portion of the company's business resulting from incidental repairs to ships using the Port should be considered. Based on information received from company officials by staff of the Department of Commerce and Technology, it is estimated that approximately 29 person-years of employment are port related. An additional allowance has been made for an estimated 10 person-years of work in total by a number of firms providing other repair services such as refrigeration and marine equipment repairs and general welding. Therefore, a total of 50 person-years of employment are estimated for port related ship repairs and maintenance activities.

3.2.5 Warehousing

One firm, Baxter's Cold Storage provides cold storage facilities, while seven household and moving companies make available general warehouse space, although the latter is seldom utilized for port traffic. Based on discussions with Ports Canada and Port Commission officials, it is estimated that the equivalent of 10 person-years of employment is created at off-site warehousing facilities as a result of port related activities.

3.2.6 Rail Employees

Both CN Rail and CP Rail have extensive facilities serving the Port, with CN facilities concentrated on the east side of the harbour, and CP facilities concentrated on the west side. It was decided not to include train crews in the count of employees, except for yard crews dedicated to

Port service, even though it could be argued that the CN potash trains from the Sussex area mines and a large portion of the CP freight trains would not be in service in New Brunswick without the Port facilities. Discussions with CN and CP rail officials determined that a total of two person-years of employment with CN and 87 person-years with CP can be considered dedicated to activities associated with the Port of Saint John. A breakdown of port related employment by the two rail companies is presented in Table 3.4. Both rail companies have experienced reductions in their port related workforce since 1977, but particularly CN. In 1977, CN and CP had a total of 317[5] freight handlers who worked a total of 142 person-years as truck drivers, tractor maintenance men, timekeepers, checkers, shedmen, cargo sealers, gear repair men, and tractor and crane operators. Today, all of the (Local 297) CN positions have been eliminated as a result of the termination of CN Route trucking operations and reduced freight handling. According to rail officials, jobs formerly performed by freight handling rail employees are now performed by ILA stevedores.

3.2.7 Trucking Employees

A total of 25 trucking companies provide services to the Port of Saint John. Of these companies, five are licensed to haul internationally, eight are licensed to haul interprovincially, eight are licensed to haul provincially, and four are licensed to haul locally. Collectively, these firms employ approximately 10 000 persons. It is difficult to determine precisely the proportion of these jobs related to Port of Saint John activities. Furthermore, if those truckers were not hauling cargo to and from the Port of Saint John, in many cases they would be hauling the cargo to an alternative port. Therefore, these jobs have not been included in the direct jobs associated with port activities. However, it should be noted that many persons are employed hauling cargo to and from the Port for major facility users, such as St. Anne Nackawic.

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5 CP employees were members of Local 797 of the Brotherhood of Railway, Airline and Steamship Clerks, Freight Handlers, Express and Station Employees. CN employees were members of Local 297 of the Canadian Brotherhood of Railway, Transport and General Workers.

Table 3.4

RAIL COMPANY EMPLOYMENT
ASSOCIATED WITH PORT OF SAINT JOHN

CP Rail Employment

Track and Yard Maintenance	9
CP employees at Brunterm	9
Investigation Department	5[1]
Switching Crews (Average of High and Low Season)	24
Office staff	18
Mechanical Department	22
Marketing and Sales	0
TOTAL EMPLOYMENT	87 Person-Years
TOTAL WAGES	$2 907 000

CN Rail Employment

Portion of Yard Crew Dedicated to Port Activities - 2 Person-Years[1]
Total Wages - $66 830

Total Port Related Employment by Rail Companies

Total Person-Years - 89
Total Wages - $2 973 830

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1 An additional seven CP Rail employees and six CN Rail employees providing security services at the Port are included in Table 3.1 under Security Services.

3.2.8 Technical Services

Technical services include cargo surveying, sampling, weighing and ship classification and surveying. Four companies provide cargo surveys and inspections at the Port while five cargo classification companies are represented. Based on discussions with Port officials, it is estimated that a total of eight person-years of employment results from provision of these port related technical services.

3.2.9 Dredging

It is estimated that 380 000 cubic metres of dredging is conducted annually at the Port. The dredging services are normally contracted to private firms. It is estimated that five person-years of employment and wages of $140 000 are associated with these dredging contracts.

3.2.10 Pilotage

Based on discussions with the Saint John Area Pilotage Office, it was determined that a total of seven harbour pilots and four additional crew personnel (two launch masters; two deckhands) provide harbour pilot services at the Port of Saint John under auspices of the Atlantic Pilotage Authority. Therefore, a total of 11 person-years of employment are associated with provision of pilotage services at the Port.

3.2.11 Specialty Services

Included in this category is the port related employment by ten companies which provide freight forwarding and/or custom house brokerage services. Based on discussions with the Port Commission and Ports Canada, it is estimated that 10 person-years of employment results from provision of these services.

3.2.12 Agencies, Ship Brokers, Ship Operators

Although many shipping lines serve the Port of Saint John, only a few have offices located in the city. Most shipping lines are represented by one of the ten companies presently providing shipping agent/brokerage services. In addition, the Kent Line Limited are also ship owners and have approximately 100 Saint John based persons employed on forest products vessels and a tanker fleet.

Based on discussions with each of the active companies, it was found that 59 persons are employed in the shipping agency/brokerage business and 100 Saint John area persons are employed as vessel crews, for a total employment level of 159 person-years.

3.2.13 Customs and Excise

Discussions with the Area Manager, Customs and Excise Branch of Revenue Canada, revealed that at present 38 person-years of employment are associated with clearing of cargo and vessel crew members through customs. This compares to 54 person-years associated with these functions during 1977, when customs officers spent more time on the waterfront. Now most customs clearing is conducted in the offices.

3.2.14 Security Services

Police and security services are provided by 26 Ports Canada employees, as well as 7 CP Rail employees and 6 CN Rail employees[6]. Therefore, a total of 39 person-years of employment providing wages of $1 065 000 are counted in the port related employment associated with security services.

3.2.15 Insurance

Seven companies are listed in the current Port Directory as providing marine insurance, and three companies are listed as insurance adjusters.

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6 Five additional CP Rail employees, an investigator and four constables who are employed at Brunterm have been included in the sub-section on rail employment.

These companies are general insurance agencies and only a minor part of their total business is related to the Port. An estimate of two person-years of employment has been assumed for port related insurance business.

3.2.16 Grain Handling

Maple Leaf Mills (a company owned by Canadian Pacific) operates the grain elevator facilities at the Port. Discussions with the manager revealed that total employment at the facility fluctuates dramatically with the season. Present staff including office personnel and members of ILA Local 1121 is 16 persons, while last winter 54 persons were employed. Based on present payroll projections it is estimated that 21 person-years of employment are being realized during 1986.

3.2.17 Ports Canada

Ports Canada employment associated with general Port management and administration includes 78 person-years of employment and annual wages of $2 028 000. Functions performed by Ports Canada personnel include supervision of engineering and maintenance services, financial and administrative services, marketing services, operational (harbour master) services, personnel and industrial relations, purchasing and supervision of policing services[7].

3.2.18 Public Works Canada

Discussions with an official of Public Works Canada revealed that the only functions performed by this department related to Port activities involve an average of one and one-half person-years required for administration of dredging contracts and a further one-half person-year associated with administration of contracts for breakwater maintenance and accounting personnel. Therefore, a total of two person-years of employment associated with port related activities has been assumed.

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7 Policing services include 26 additional Ports Canada personnel, 12 CP Rail employees, and 6 CN Rail employees that have been included in other sub-sections.

3.2.19 Transport Canada (Including Coast Guard Services)

Discussions with the District Manager for Transport Canada revealed that 21 person-years of employment are associated with administrative activities regarding Port operations. A total of 224 person-years of Coast Guard employment are associated with the Port of Saint John. The chief functions of Transport Canada (which includes the Coast Guard) include the following:

1). Saint John is the base for provision of aids to navigation services stretching from Cape Sable to Maine along the Fundy Coast; the Saint John River and Mactaquac Headpond; and Northern Nova Scotia Fundy shore including Hantsports and Minas Basin. Navigation aids maintained include fixed and floating lights, buoys and radio communications.

2). Pollution Response Services - the Saint John office services all of New Brunswick by making available pollution control equipment from stations located in Newcastle, North Head, St. Andrews and Saint John. Helicopters are available to enable a speedy response.

3). The Saint John base provides a secondary role as a back-up squad for search and rescue operations.

A breakdown of the Coast Guard employment is as follows:

- light keepers	- 50 person-years
- ship assignment	- 83 person-years
- vessel traffic services, labour, operators, office, technical	- 91 person-years
TOTAL	224 person-years

For purposes of calculating the benefits associated with these Transport Canada and Coast Guard jobs, one must consider what portion of the jobs are really related to Port of Saint John activities. If the Port of Saint John did not exist, it is estimated that all 21 person-years of employment

with Transport Canada would disappear and 70 percent of the jobs with the Coast Guard would disappear. Therefore, for purposes of calculating the employment benefits arising from Port of Saint John activities associated with these jobs, it is assumed that a total of 21 person-years of Transport Canada employment and 157 person-years of Coast Guard employment are Port related.

3.2.20 Marine Atlantic Inc.

Marine Atlantic Inc. operates a year round passenger and highway vehicle ferry service between the Port of Saint John and Digby via the vessel Princess of Acadia. Discussions with company officials revealed that the service employs Saint John area residents as follows:

Summer Season		Winter Season	
Vessel Crew	114	Vessel Crew	86
Catering	30	Catering	7
Terminal	28	Terminal	25
TOTAL	172	TOTAL	118

Therefore, it is estimated that port related employment on the ferry service averages 145 person-years with annual wages of $3.7 million.

4.0 BENEFITS OF EMPLOYMENT AT THE PORT OF SAINT JOHN

The workers employed at the Port of Saint John, at a given point in time, may have come from other jobs or from the ranks of the unemployed. If a port worker has vacated a job elsewhere, his former position may be refilled by a previously unemployed person. According to this "trickle down" notion of job creation, jobs are usually viewed as eventually being filled by previously unemployed or underemployed persons, especially in labour market areas characterized by high unemployment rates.

The social opportunity cost of labour is a concept used to determine the costs of labour in a worker's next best alternative. The next best alternative to employment at the Port, for many workers, given the present unemployment rate in the Saint John area, would likely be a combination of unemployment, short term work at lower pay, periods receiving unemployment insurance, and welfare. Certainly, some port workers would leave New Brunswick in search of alternative employment if they lost their jobs at the Port, and their total output and expenditures would be lost to the Provincial economy.

Considerable empirical research has been conducted by economists in order to estimate the benefits of employment under various labour market conditions. The underlining principles associated with the assessment of the employment benefits resulting from a project may be summarized as follows:

1). At high rates of unemployment, society gains from employment creation or employment maintenance. An appropriate measure of this social gain is the difference between the wages earned by the employed workers and what they would earn in their next best alternative (ie. their social opportunity cost).

2). The higher the unemployment rate, the greater the chances that a worker employed on a project will have been previously unemployed, and therefore, the greater the social gain (or

benefit) associated with employment. In fact, it has been shown that at very high levels of unemployment (25 percent or higher) all persons employed on a project will involve recruitment of workers from the ranks of the unemployed (not necessarily directly).

A methodology has been devised in order to assist researchers in estimating the social opportunity cost of labour in circumstances where a comprehensive labour market analysis is not possible. This methodology compares the probability of a hired worker coming from the ranks of the unemployed in the existing labour market situation, with the situation which existed under both the most favourable and most unfavourable labour market conditions in the region, in recent history (ie. when the unemployment rate was at its lowest and highest). In terms of the present labour market in the Saint John area, Statistics Canada recorded an average unemployment rate of 14.5 percent during August, 1986 and this rate would appear to be a reasonable estimate of the average unemployment rate for 1986[1]. This rate compares to the lowest unemployment rate achieved in the New Brunswick economy in 1966 of 5.3 percent and the unacceptably high rate of 20 percent experienced in the Canadian economy in 1933. The calculation of the present social opportunity cost of labour for the Saint John area is presented in Table 4.1. It is estimated that the probability that a new worker hired at the Port of Saint John would come from the ranks of the previously employed is 30.7 percent. Based on this level of probability of hiring workers previously employed, it is estimated that the social opportunity cost of labour is 44.6 percent of the wage rate.

The social gains or benefits associated with permanent employment are normally calculated by lowering the wage costs of companies to their social opportunity costs. For example, if an individual earning $25 000 at the Port has a next best alternative earnings of $15 000 through a

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1 This rate compares to an annual average unemployment rate during 1985 of 15.6 percent. During subsequent months in 1986, the unemployment rate was 15.2 percent (January); 15.8 percent (February); 14.9 percent (March); 14.5 percent (April); 14.5 percent (May); 13.7 percent (June); 12.8 percent (July); 14.5 percent (August).

Table 4.1

CALCULATION OF SOCIAL OPPORTUNITY COST OF LABOUR

Let P represent the probability of hiring a person at the Port of Saint John, who is already employed.

$$P = 1 - 0.5 \left(\text{Sin} \left[\pi \frac{(U - Ub)}{UM - Ub} - \frac{\pi}{2} \right] + 1\right)$$

WHERE: U = actual unemployment rate in the area (14.5%);

Ub = Base unemployment rate in the area (5.3%);*

UM = maximum unemployment rate (taken to be 20%);**

and $\left[\pi \frac{(U - Ub)}{UM - Ub} - \frac{\pi}{2} \right]$ is a radian value

$$P = 1 - 0.5 \left(\text{Sin} \left[\pi \frac{(14.5 - 5.3)}{20 - 5.3} - \frac{\pi}{2} \right] + 1\right)$$

$$= 1 - .6926$$

$$= .3074$$

Therefore, Social Opportunity Cost of Labour = (.8 P + .2)

= .4459

Use .446

* Unemployment rate achieved in 1966.

** Based on highest level of unemployment experienced in Canada, in 1933.

combination of short term lower paying jobs and unemployment insurance benefits, then his social opportunity cost is $15 000 and society gains $10 000 by having him fully employed in a higher paying job at the Port.

In 1986, it is estimated that the 1 328 person-years of employment generated in port related activities will result in earnings of $38 694 000. The estimated social opportunity cost of these wages is $17 258 000, implying a benefit to society of $21 436 000 resulting from the maintenance of permanent employment in these relatively high paying jobs.

The recent Federal Task Force on Labour Market Development confirmed that their can be substantial gains from incremental creation or maintenance of permanent jobs[2]. However, it was argued that from initial gains of as high as 60 to 80 percent of the wage bill, over time, with existence of in and out migration, unemployment rates will be re-established in historical relationships with other regions.

Certainly, the benefits of employment creation and maintenance should be viewed in a dynamic context. For example, in Saint John it is to be hoped that employment opportunities will improve in New Brunswick's chief industrial city, so as to reduce the unemployment rate to more acceptable levels of 7 - 8 percent. As the employment situation improves, the social gain associated with each particular job is reduced as the social opportunity cost of labour approaches the wage bill. For example, making use of the same formula depicted in Table 4.1, if the unemployment rate were to reduce to 8 percent, the social opportunity cost of each job would increase to 93.5 percent of the wage bill, and the resulting social gain from each job would be 6.5 percent of the wage bill. This type of reasoning led the Task Force to suggest that when both long and short term effects are taken into consideration, the benefits of creating permanent jobs are typically in the order of 10 to 15 percent.

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2 Employment and Immigration Canada; Labour Market Development in the 1980's, Report of the Task Force on Labour Market Development, July, 1981, pp. 117 - 118.

For purposes of this study, it is assumed that the unemployment rate in Saint John is gradually reduced to 8 percent, from the present 14.5 percent over a period of 10 years. This will have the effect of reducing the benefits associated with employment from $21.4 million in 1986 to $2.5 million in 1996 (expressed in terms of 1986 constant dollars). The resulting benefits from employment over the 1986 - 1996 period are summarized in Table 4.2, assuming no significant changes in present employment levels.

Table 4.2

PROJECTED BENEFITS OF EMPLOYMENT AT THE
PORT OF SAINT JOHN
1986 - 1996
(Expressed in Terms of Constant 1986 Dollars)

Year	Annual Wages ($x1000)	Projected Unemployment rate %	Social Opportunity Cost (% of Wage Rate)	Employment Benefits ($x1000)
1986	38 694	14.5	44.6	21 436
1987	38 694	13.5	53.0	18 186
1988	38 694	12.5	61.3	14 975
1989	38 694	11.5	69.7	11 724
1990	38 694	11.0	73.8	10 138
1991	38 694	10.5	77.7	8 629
1992	38 694	10.0	81.5	7 158
1993	38 694	9.5	84.9	5 843
1994	38 694	9.0	88.1	4 605
1995	38 694	8.5	91.0	3 482
1996	38 694	8.0	93.5	2 515

5.0 BENEFITS TO NEW BRUNSWICK COMPANIES SHIPPING COMMODITIES OUTBOUND THROUGH THE PORT OF SAINT JOHN

In order to estimate the benefits to New Brunswick companies exporting cargo through the Port of Saint John, it was necessary to compare the costs of shipping their products through the Port of Saint John with the costs that would be incurred using the next best alternative port. Based on a review of cargo origins and destinations for the commodities shipped through the Port of Saint John by New Brunswick companies, it soon became evident that the Port of Halifax would usually represent the next best alternative port facility. This was concluded since the vast majority of exports by New Brunswick companies are destined for overseas markets. It was also determined that the majority of cargo shipped through the Port of Saint John by New Brunswick companies is delivered to the Port by the trucking mode. A notable exception is the potash which is delivered to the Port by a dedicated unit train service. In the majority of cases, therefore, it was considered most reasonable to compare the costs of highway shipment from the New Brunswick company warehouse, to the Ports of Saint John and Halifax. However, for shipments originating in the Edmundston, Kedgwick, Dalhousie and Atholville areas, the Port of Quebec City was selected as the likely alternative port because of shorter highway distance. However, it is possible that winter ice conditions in the St. Lawrence River plus the longer shipping distances by water to reach Quebec City could still favour Halifax over Quebec City as the preferred alternative port.

Ports Canada personnel were able to provide a listing of the quantities of various products shipped through the Port by each New Brunswick company, including the consignee name and address. This listing is considered confidential for reasons of competitive position with other ports. From this listing the Study Team were able to extract a comprehensive summary of the quantities of all types of cargoes exported through the Port from individual communities, and individual companies within those communities.

The next task was to estimate appropriate truckload shipment sizes for each of these types of cargo. Based on previous work, the Study Team was

able to generate a comprehensive listing of average cargo shipment sizes for 2, 3, 4, 5 and 6 axle semi-trailer rigs travelling in the Atlantic Provinces, based on the computerized data base of the 1984 Truck Origin-Destination Survey. It was determined, for example, that the majority of forest products are hauled in 6-axle semi-trailer rigs (using tri-axle trailers) and the average pay load is 31.3 tonnes, in the case of wood pulp, and 24.9 tonnes, in the case of sawn lumber. On the other hand, fish products and fruits and vegetables are more commonly hauled in 5-axle semi-trailer rigs (using two-axle trailers) and the average payload is 19.5 tonnes. By dividing the annual quantity of a product shipped through the Port by the average trailer shipment size, the number of truckloads required to transfer the product to port was calculated. The trucking cost per kilometre was determined by using a widely accepted truck operating cost model and inflating these 1984 costs by the transportation cost component of the consumer price index[1]. Since the truck operating costing model provided data only on 5-axle semi-trailers, the additional costs associated with operating 6-axle semi-trailers was estimated based on data found in another study[2]. Utilizing the three sources of data, the average operating costs of 5-axle semi-trailer units was estimated to be $1.10 per kilometre and the average operating costs of 6-axle semi-trailers was estimated to be $1.14 per kilometre.

For each shipper origin, it was then necessary to determine the return distance to the Port of Saint John and the alternative port (Quebec City or Halifax). Making use of this data, it was then possible to determine the difference in land transportation costs from the shipper's plant to the Port of Saint John versus the most likely alternative port.

The calculation sheet used to estimate the overall benefits to New Brunswick companies exporting cargo through the Port of Saint John is

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1 Trimac Consulting Services Ltd.; Operating Costs of Trucks in Canada -1984, study prepared biannually for the Motor Carrier Branch, Transport Canada, Sept., 1984.

2 Fiander-Good Associates Ltd.; The Atlantic Provinces Primary Highway Strengthening/Improvement Program Motor Carrier Benefit Study prepared for Governments of the Atlantic Provinces and Transport Canada. Sept., 1985

Table 2.1

BENEFITS TO NEW BRUNSWICK COMPANIES FROM OUTBOUND COMMODITY SHIPMENTS THROUGH THE PORT OF SAINT JOHN (1986)

Shipper location	Products	Annual Quantity Tonnes	Distance to Saint John Port	Distance to Alternative Port	Average Payload Size Tonnes	Number of Truckloads	Truckload[1] Cost/Km	Shipping Cost to Saint John($)	Shipping Cost to Alternative Port ($)	Cost Saving Using Saint John ($)
Mackenzie	Wood Pulp	100 000	175 km	540 km	31.5 Tonnes	3 965	$1.14	2 544 946	7 600 812	5 055 866
Saint John	Wood Pulp	120 742	40 km	424 km	31.5 Tonnes	3 830	$1.14	351 850	3 729 686	3 377 756
Saint John	Paper, Paperboard & Newsprint	299 720	40 km	424 km	29.7 Tonnes	8 994	$1.14	785 773	8 307 992	7 524 219
Saint John	Lumber & Plywood	9 687	40 km	424 km	24.0 Tonnes	397	$1.14	36 206	383 788	347 582
Saint John	Ores, Concentrates & Minerals	12 066	40 km	424 km	21.8 Tonnes	554	$1.10	48 752	516 771	468 019
Saint John	Sulphur, Chemicals, & Asbestos	14 681	40 km	424 km	28.1 Tonnes	530	$1.14	49 197	521 062	471 905
Saint John	Alcoholic Beverages	5 390	40 km	424 km	28.1 Tonnes	260	$1.10	23 584	248 988	230 406
Saint John	Fish Products	5 188	40 km	424 km	19.5 Tonnes	360	$1.10	25 498	268 125	234 717
Saint John	Fruits & Vegetables	4 381	40 km	424 km	19.5 Tonnes	225	$1.10	19 688	237 864	218 864
Saint John	Other Misc.	2 990	40 km	424 km	19.5 Tonnes	153	$1.10	13 464	143 029	129 565
Saint John	Marine Atlantic Inc. Miscellaneous Products	67 012	N/A	424 km	19.5 Tonnes	2 452	$1.10	1 754 299[1]	2 287 236	532 937
Saint John	Wheat & Petroleum Products Omitted									
Shippegan	Peat Moss	7 690	701 km	515 km	18.7 Tonnes	388	$1.10	339 478	441 478	106 382
Sussex	Potash & Salt	250 000	45 km	239 km	Unit Train Rate $4.26/Tonne	N/A	Unit Train Rate[2] $10.76/Tonne	1 073 450	2 685 624	1 610 174
Edmundston	Wood Pulp	16 403	375 km	364 km[3]	31.5 Tonnes	534	$1.14	448 020	448 020	—[4]
St. George	Newsprint, Paperboard	13 500	69 km	504 km	29.7 Tonnes	491	$1.14	70 951	518 293	447 342
Nathaway	Lumber	11 045	28 km	488 km	24.0 Tonnes	646	$1.14	30 350	414 887	384 540
Grand Falls	Potatoes	10 262	339 km	894 km	19.5 Tonnes	530	$1.10	360 327	883 488	434 161
Florenceville	Frozen Foods	9 486	248 km	625 km	19.4 Tonnes	385	$1.10	154 489	387 680	233 479
Blacks Harbour	Canned Fish	3 887	88 km	388 km	21.8 Tonnes	178	$1.10	27 839	197 758	170 758
Cape Pele	Canned Fish	2 556	288 km	288 km	21.8 Tonnes	116	$1.10	32 371	68 849	16 878
Newcastle-Miramichi	Woodpulp	4 178	272 km	488 km	31.3 Tonnes	134	$1.14	85 101	124 841	40 940
Moncton	Frozen Foods	1 536	152 km	273 km	19.4 Tonnes	79	$1.10	36 418	67 447	31 029
Edgemont	Lumber	1 250	415 km	430 km[3]	24.0 Tonnes	58	$1.14	47 310	48 336	1 026
Atholville & Dalhousie	Woodpulp & Newsprint	1 783	498 km	582 km[3]	31.3 Tonnes	57	$1.14	90 522	69 240	9 718
Caraquet	Canned Fish	1 863	367 km	512 km	30.3 Tonnes	37	$1.14	32 912	43 543	10 631
Woodstock	Lumber	877	288 km	288 km	24.0 Tonnes	39	$1.14	18 439	45 890	27 451
Bathurst	Paper	271	399 km	469 km	29.7 Tonnes	9	$1.14	7 289	9 624	2 336
Bloodville	Lumber	172	236 km	446 km	24.0 Tonnes	7	$1.14	3 767	7 988	3 290
Boutsouche	Fish	150	220 km	311 km	19.5 Tonnes	8	$1.10	3 872	9 474	1 602
Deer Island	Canned Fish	85	97 km	333 km	21.8 Tonnes	4	$1.10	854	4 690	3 836
Juniper	Lumber	61	264 km	499 km	24.0 Tonnes	3	$1.14	971	4 588	3 557
Fredericton	Scrap Metal	57	165 km	415 km	28.3 Tonnes	2	$1.14	470	1 992	1 422
Tabusintac	Peat Moss	11	188 km	432 km	18.7 Tonnes	1	$1.10	722	994	272
Moncton	Music Instruments	10	170 km	485 km	19.5 Tonnes	1	$1.10	356	1 885	681
	TOTAL N.B. CARGO	998 959					TOTAL	10 264 836	138 300 488	122 135 644

(1) Cost includes highway shipment from Halifax to Digby plus ferry costs.

(2) It is assumed that the costs of shipping by Unit Train from Sussex to Halifax would be 2.5 times the Sussex to Saint John rate.

(3) Truckload costs per kilometre are estimated to be $1.10 per km for 5-axle semi-trailers and $1.14 per km for 6-axle semi-trailers.

(4) It is assumed that the additional cost of shipping by water from Quebec City to overseas markets offset the longer highway distance from Edmundston to Quebec City.

(5) In this case the alternative port selected was Quebec City.

summarized in Table 5.1. It can be noted that a distance to the Port of Saint John for shipments originating in Saint John is presented as 40 km in most cases. It was felt that the allowance of an 80 km round-trip for local shipments would be sufficient to cover the fixed costs associated with these shipments, which might not be adequately covered in the truckload cost per kilometre because of the relatively short distances involved.

As can be noted from the above discussion and a review of Table 5.1, the cost savings (benefits) to New Brunswick companies have been based on the estimated incremental operating costs to haul their cargo to the next best alternative port if the Port of Saint John were not available.

Some consideration was given by the Study Team to making use of actual published tariffs, where possible for shipping cargo to Saint John or the alternative port. However, shipper rates at any point in time are subject to many competitive as well as non-market forces and may not accurately reflect the actual transportation costs involved. For example, a few ocean shipping companies will provide service to a shipper which is equal in costs whether shipped through Halifax or Saint John, regardless of the shipper's actual location in the Maritimes. Therefore, it was decided that a methodology which was based on estimating the actual incremental transportation costs involved with transporting commodities to Saint John or the alternative port would more accurately reflect the long term comparitive societal costs of using one port versus another. It is considered unlikely that those companies now providing equalized shipping rates to New Brunswick customers (same shipping cost for using Port of Halifax as for Port of Saint John) would continue to do so if the Port of Saint John did not exist as a competitive port. Therefore, if the Port of Saint John did not exist, then the overland shipping charges to the alternative port would certainly more closely reflect the actual costs involved.

It is evident from a review of Table 5.1 that New Brunswick companies derive substantial economic benefits from utilizing the Port of Saint

John, in terms of cost savings realized by not having to ship their products through alternative port facilities. In many cases, it would not be feasible to consider an alternative New Brunswick port, such as Dalhousie, Newcastle, or Bayside for a number of reasons. One reason would be the lack of diversified port related services such as container terminals or bulk loading/unloading facilities. A more likely factor limiting the opportunities for shipping cargo through the alternative New Brunswick ports is the small number of ships calling at these ports on a scheduled basis. Unless a company were shipping sufficient volumes of cargo so as to warrant a specially chartered ship, it would be difficult to convince shipping lines to travel the additional distance from international routes to make stops at these other ports. Finally, the size of many ocean going bulk-carrier and container ships has increased to the point where draft requirements limit their ability to call at certain New Brunswick ports, such as Newcastle.

The commodity shipments outbound through the Port of Saint John depicted in Table 5.1 collectively represent 996 935 tonnes of cargo being sent chiefly to countries in the Far East, South East Asia, the Mediterranean, Australia/New Zealand, South America, the Caribbean, U.S.A. and Western Europe.

Total annual cost savings to New Brunswick companies as a result of being able to ship commodities through the Port of Saint John are estimated to be $22.1 million. Approximately $16.5 million (74 percent) of these savings are associated with shipments of wood pulp, paper, paperboard and newsprint from major pulp and paper mills throughout the Province. Other major savings include $1.6 million (7.3 percent) to the potash and salt producers in the Sussex area and 0.8 million (3.5 percent) to the lumber producers located throughout various parts of the Province. It should be noted that no benefits have been calculated for the 70 101 tonnes of wheat and the 1.8 million tonnes of petroleum products which are shipped outbound from the Port. In the case of wheat, the grain is not produced in New Brunswick. The product is transported from provinces west of New

Brunswick and stored at the Maple Leaf Mills elevator awaiting shipment. Therefore, the main benefits to New Brunswick citizens resulting from this commodity movement are the jobs at the Port involving unloading the material from rail freight cars and subsequent reloading of grain unit ships. Benefits from these jobs are included in Chapter 3.0.

In the case of petroleum products, the majority of these liquid bulk products are shipped through the privately owned Canaport facilities. If the Port facilities were not available, it is probable that the Irving oil refinery would be located in another province. Therefore, it could reasonably be argued that if Saint John port facilities were not available for shipment of petroleum products, the chief loss of benefits to New Brunswick would involve the loss to the Province of the approximately 425 relatively high paying jobs at the oil refinery. However, the benefits of jobs at the oil refinery and those directly associated with shipments of petroleum products have not been included in Table 5.1. It could reasonably be argued that if the Port of Saint John facilities were not available, alternative nearby deep-water locations such as Lorneville could be used to establish a mooring buoy for the transfer of refined petroleum products from the oil refinery facilities to oil tankers for shipments to coastwise and export markets.

6.0 BENEFITS TO NEW BRUNSWICK COMPANIES FROM INBOUND COMMODITY SHIPMENTS THROUGH THE PORT OF SAINT JOHN

The methodology used to determine the benefits to New Brunswick companies resulting from inbound commodity shipments through the Port of Saint John was similar to that used to determine benefits of outbound shipments through the Port. In this case, the transportation cost savings to New Brunswick companies receiving inbound shipments of either finished goods (such as machinery for resale) or factors of production (such as raw sugar and chemicals) through the Port of Saint John as compared to receiving these commodities through the most logical alternative port, were considered. For most of these commodity movements within the Maritime region, it was determined that 5 and 6-axle semi-trailer trucks would be able to offer competitive transportation rates to the rail mode, given the distances and average unit cargo sizes involved.

Although the Port of Halifax was generally selected as the logical alternative port facility, the Port of Quebec City was selected as the alternative port facility for cargo destinations in Grand Falls, Centreville, and Florenceville because of closer highway distance. Cost savings were calculated for a total of 309 639 tonnes of cargo being brought into New Brunswick by various companies located throughout the Province, but predominately companies in the immediate Saint John vicinity, Dalhousie (N.B.I.P.), Moncton and St. Andrews. As depicted in Table 6.1, total annual cost savings to New Brunswick companies from inbound commodities received through the Port of Saint John are estimated to be $5.3 million. The largest cost saving of $2.5 million are attributed to the Atlantic Sugar refinery for its imports of raw sugar. A number of companies (particularly pulp and paper mills) importing chemicals are estimated to save $1.5 million. New Brunswick companies receiving products from Nova Scotia by means of the Atlantic Marine ferry service from Digby to Saint John are estimated to save approximately $554 000 compared to the alternative trucking costs by land from the Halifax area. Substantial annual savings of $491 000 are also estimated to accrue to a Saint John based company receiving shipments of molasses from Barbados and the Dominican Republic.

BENEFITS TO NEW BRUNSWICK COMPANIES FROM INBOUND COMMODITY SHIPMENTS THROUGH THE PORT OF SAINT JOHN (1986)

Company location	Products imported	Annual Quantity Tonnes	Distance from Saint John Port	Distance from Alternative Port	Average Shipment Size Tonnes	Number of Truckloads	Truckload[1] Cost/Km	Shipping Cost from Saint John[2]	Shipping Cost from Alternative Port [2]	Cost Saving Using Saint John [3]
Coleson Cove	Fuel Oil	298 277	40 km	424 km	28.0 tonnes	10 222	$1.10	N/A	N/A	N/A[4]
Dalhousie	Wood Pulp	6 650	440 km	951 km[5]	31.3 tonnes	148	$1.10	148 676	189 306	40 630
Saint John	Raw Sugar	197 429	40 km	424 km	N/A	N/A	Unit Train Costs $12.84/tonne	N/A	2 534 988	2 534 988[5]
No benefits estimated for 677 091 tonnes of fuel oil, 221 700 tonnes of gasoline, 2 704 615 tonnes of crude oil imported through the Port.										
Saint John	Chemicals	41 062	40 km	424 km	24.2 tonnes	1 697	$1.10	150 766	1 640 530	1 489 750
Saint John	Molasses	12 550	40 km	424 km	24.7 tonnes	508	$1.10	-	491 094	491 094
Saint John	Textiles	749	40 km	424 km	21.7 tonnes	34	$1.10	2 992	31 715	28 723
Saint John	Iron & Steel Alloys	442	40 km	424 km	22.3 tonnes	20	$1.10	1 829	19 334	17 510
Saint John	Wood Fabricated Materials	376	40 km	424 km	21.1 tonnes	18	$1.10	1 642	17 401	15 759
Saint John	Motor Vehicles Parts	327	40 km	424 km	16.8 tonnes	20	$1.10	1 760	18 456	16 696
Saint John	Sugar, Cocoa, Margarine	333	40 km	424 km	20.5 tonnes	16	$1.10	1 499	15 466	14 009
Saint John	Non-Metallic Minerals	266	40 km	424 km	27.3 tonnes	10	$1.10	912	9 667	8 755
Saint John	Fruit & Vegetable Pulp	252	40 km	424 km	25.2 tonnes	10	$1.10	912	9 667	8 755
Saint John	Fish Products	220	40 km	424 km	19.5 tonnes	12	$1.10	1 056	11 186	10 130
Saint John	Sand & Gravel	114	40 km	424 km	27.5 tonnes	4	$1.10	365	3 867	3 502
Saint John	Cement & Concrete	81	40 km	424 km	28.0 tonnes	3	$1.10	274	2 900	2 626
Saint John	Miscellaneous	903	40 km	424 km	19.5 tonnes	46	$1.10	4 048	42 909	38 861
Saint John	Miscellaneous Via Marine Atlantic Inc.'s Digby Service	47 892	220 km (Wtn.-Digby)	424 km	19.5 tonnes	2 456	$1.10	1 731 120[6]	2 290 997	559 828
Moncton	Motor Vehicle Parts	683	152 km	275 km	16.6 tonnes	41	$1.10	13 710	24 629	10 919
Moncton	Meat & Preparations	411	152 km	275 km	14.9 tonnes	28	$1.10	9 363	16 817	7 454
Moncton	Fruit & Vegetables	176	152 km	275 km	25.2 tonnes	7	$1.10	2 426	4 357	1 931
Moncton	Miscellaneous	68	152 km	275 km	18.9 tonnes	3	$1.10	1 003	1 802	798
St. Andrews	Fish Products	249	98 km	321 km	19.5 tonnes	13	$1.10	2 746	16 901	13 155
Grand Falls & Centreville	Machinery, Engine Parts	351	389 km	422 km[6]	18.8 tonnes	19	$1.10	8 398	12 080	3 681
Sussex	Sugar, Cocoa, Margarine	86	75 km	391 km	20.5 tonnes	4	$1.10	646	5 269	2 939
Fredericton	Machinery & Equipment	63	103 km	419 km	15.8 tonnes	4	$1.10	908	5 656	2 748
Florenceville	Fish	51	248 km	648 km[6]	19.5 tonnes	3	$1.10	1 477	2 964	1 507
TOTAL		599 866 (300 439 without fuel oil for Coleson Cove)						22 090 270	27 414 013	89 319 739

(1) Truckload costs per kilometre are estimated to be $1.10 per km for 5-axle semi-trailers and $1.34 per km for 6-axle semi-trailers.

(2) It is assumed that an alternative deep water receiving facility would be constructed at a nearby Bay of Fundy location, if the Port of Saint John were not available for receiving shipments of fuel oil. Consequently, no benefits have been assigned.

(3) Three alternatives for receiving raw sugar at the Port of Saint John were calculated.

(a). Trucking sugar to Saint John from the Port of Halifax would cost approximately $7.7 million per year in additional costs.

(b). The costs presented are the least incremental cost alternative representing the estimated costs of a unit train service for rail shipment of sugar from the Port of Halifax to the Saint John plant.

(c). A third alternative, and likely the most realistic one would involve the closure of the Saint John sugar refinery due to high transportation costs, if raw sugar could not be received through the Saint John port facility. This would mean the loss of 400 - 450 Saint John jobs, representing taxes on wages of approximately $8.0 million and lead to the creation of economic benefits from these jobs of approximately $6.7 million to NBSB areas.

(4) Cost includes high shipment cost from Halifax to Digby plus costs of Marine Atlantic ferry from Digby to Saint John.

(5) Halifax and Quebec City are approximately of equal highway distances, however, Halifax is favoured because of shorter ferr conditions and the longer ocean shipping distance to Quebec City.

(6) In this case the alternative port selected was Quebec City.

It can be noted from Table 6.1 that no cost savings have been estimated for the New Brunswick Electric Power Commission as a result of the large shipments of fuel oil received through the Port of Saint John. It has been assumed that if the Port of Saint John were not available for receiving shipments of fuel oil, then an alternative deep water mooring facility could be constructed at a nearby Bay of Fundy deep water location.

It should also be noted that no cost savings have been calculated for the crude and refined petroleum products received through the Saint John harbour facilities. These shipments include 677 891 tonnes of fuel oil, 221 700 tonnes of gasoline and 2 704 613 tonnes of crude oil imported through the Port. It was considered probable that if the Port of Saint John facilities were unavailable for receiving petroleum products, one of two scenarios might have unfolded. Either the Irving interests would have constructed Canaport type of deep water mooring facilities at a nearby deep water location (such as Lorneville), or else the oil refinery would not have been built in Saint John, but in another out-of-province location such as Halifax. In the former scenario, there would be no dramatic changes in the costs of getting the petroleum products ashore from the ocean-going ships since it could be piped ashore anyway, from a nearby location. However, in the latter scenario, if Port of Saint John facilities were unavailable and the refinery were built in another province, there would be a tremendous loss to the New Brunswick economy in terms of the approximately 425 high paying jobs which would be lost. The loss of these jobs could mean a loss of wages estimated at $10.6 million and loss to the Province of economic benefit from these jobs of approximately $5.9 million during 1986 alone.

In summary, there is a considerable amount of uncertainty over the alternative course of action for petroleum shipments without the Port of Saint John being available. As well, there is limited actual impact on other port operations resulting from the private Canaport and other petroleum shipping operations. Therefore, it was decided to insure that a

conservative assessment of the benefits to provincial companies was determined by not including any cost savings associated with petroleum shipments through the Port.

In the case of the tremendous volumes of shipments of raw sugar received by the Atlantic Sugar refinery from Australia, three alternative shipping cost scenarios were considered. The cost of receiving the raw sugar through the Port of Halifax was considered by both the truck and rail modes. Truck shipments would involve approximately 7 000 semi-trailer loads at an incremental cost of approximately $7.7 million dollars per year. Such a scenario was dismissed as being too costly. Given the large volume of cargo involved (197 429 tonnes), it might be possible for the company to negotiate special rates for a unit train type of service. Such a dedicated service might reduce the incremental costs to $2.5 million per year. The third alternative considered, and likely the most realistic one would involve the closure of the Saint John sugar refinery due to high transportation costs, if raw sugar could not be received through the Port of Saint John facilities. This would mean the loss of 400 - 450 Saint John are jobs, representing loss of wages of approximately $8.5 million, and loss to the New Brunswick economy of approximately $4.7 million, in 1986 alone, in the benefits associated with these jobs. It was decided once again to keep the estimate of benefits conservative and use the lowest cost savings of the three alternatives, that being for the cost savings of using Port of Saint John facilities rather than a unit train service from the Port of Halifax. Therefore, annual savings of $2.5 million per year were utilized in estimating the cost savings to the importers of raw sugar in Table 6.1.

7.0 OTHER BENEFITS FROM THE PORT OF SAINT JOHN

7.1 Introduction

This chapter briefly considers several other types of benefits resulting from the operation of the Port of Saint John facilities. These other benefit categories include annual property tax payments, motive fuel tax payments, the general impact of the Port on provincial economic development initiatives, and annual sales tax payments.

7.2 Property Tax Payments

Each year owners or lessees of the facilities at the Port of Saint John are required to pay substantial property taxes to the Province of New Brunswick. Table 7.1 summarizes the dollar value of the property assessments and the property taxes levied for major port facilities during 1986. Table 7.1 includes many facilities leased to companies, such as Atlantic Sugar Limited. These leased facilities include privately operated wharves, sheds, or office facilities used to provide port related services. Collectively, these port facilities accounted for $49 221 400 in property assessment and $2 201 095 in property taxes. A breakdown of the property tax levy on some of the major port facilities is as follows:

Ports Canada facilities - $800 000 approximately
Forest Products Terminal - $428 552
Container Terminal - $180 985
P.C.A. Terminal - $320 613
Denison Potash Terminal - $383 339
Grain Elevator - $ 87 606

It should be noted that the privately owned Irving Oil facilities including Canaport for handling petroleum products have been omitted.

A word of caution should be mentioned with regard to the treatment of these property tax revenues by the benefit-cost analysis approach. These taxes certainly represent an important source of revenues to the

Table 7.1

ASSESSED VALUES AND PROPERTY TAXES
ON FACILITIES AT PORT OF SAINT JOHN
(1986)

Property Code	Leased Facilities	Assessed Value $	Property Tax $
G2553 007 9000	Atlantic Sugar	$171 900	7 922.01
G2553 022 0000	Atlantic Towing	59 800	2 755.88
G2560 050 0000	Federal Commerce & Navigation Ltd.	79 400	3 659.15
G2560 052 8000	M.O.T.	900	41.48
G2560 053 7000	Furncan Marine Ltd.	711 200	32 775.65
Shed Leases:			
G2560 047 6000	Stevco Terminals Operators Ltd.	19 100	880.22
G2560 046 7000	Furncan Marine Ltd.	8 900	
G2560 009 2000	C.N.R.	16 200	
G2552 013 3000	City of Saint John	80 000	1 216.00
G2552 003 5000	Ceres Stevedoring Ltd. (Brown & Ryan)	34 200	1 576.11
G2501 421 6000	C.P.R.	94 600	4 359.64
G2502 437 6000	Fumigation Bldg.	111 200	5 124.65
G2502 001 2000	C.P.R.	662 900	30 549.75
G2551 018 0000	Furncan Marine Ltd.	251 400	
G2551 003 7000	Cullen Stevedoring Co. Ltd.	137 200	
G2551 005 5000	George Girouard (Residence)	16 700	514.19
G2552 012 4000	Ivan Von Richter (Residence)	20 900	330.01
G2552 009 9000	McLean Kennedy	143 300	6 603.98
G2551 021 5000	C.P.R. Marshalling Yards	481 000	22 166.89
G2552 026 8000	C.P.R. Marshalling Yards	274 300	12 641.12
G2552 025 9000	C.P.R. Marshalling Yards	492 800	22 710.69
G2552 048 2000	Brunterm Ltd.	378 800	17 457.00
G2552 050 7000	Brunterm Ltd.	3 927 200	180 985.01
G2551 069 8000	Conrads Transport Ltd.	13 200	608.32
G2551 068 9000	D.M.L. Marine Services Ltd.	18 700	861.79
G2551 056 3000	Maritime Data Centre	35 300	1 626.80
G2551 053 4000	Logistic Corp. Stevedoring Ltd.		
G2551 057 2000	S.G.S. Supervision Services Ltd.	9 200	423.98
G2551 041 1000	Furncan Marine Ltd.	9 500	
G2551 059 0000	Canada Enterprises Stevedoring Ltd.	33 100	1 525.41
G2551 063 4000	Canada Enterprises Stevedoring Ltd.	28 600	1 318.03
G2551 062 5000	Marathon Realty Co. Ltd.	44 900	2 069.22
G2551 070 5000	Maritime Employers Assoc.	12 900	
G2551 069 8000	Conrad's Transport Ltd.	13 200	608.32
G2554 001 3000	C.N.R.	22 600	
G2554 017 5000	Furncan Marine Ltd.	11 400	
G2554 020 0000	Furncan Marine Ltd.	9 800	
N/A	Denison Potash Terminal	8 318 100	383 339.00
165 8644	P.C.A. Potash Terminal	6 957 000	320 613.00

Table 7.1
(continued)

ASSESSED VALUES AND PROPERTY TAXES
ON FACILITIES AT PORT OF SAINT JOHN
(1986)

Property Code	Government of Canada Facilities	Assessed Value $	Property Tax $
G2151 041 0000	Vacant Land in front of Gulf Bayside Drive, Saint John East		
G2151 065 1000	Tidal Land South of Causeway Courtenay Bay	4 000	184.34
G2560 011 8000	Shed B Long Wharf 420034 Long Wharf 420034	3 367 500	155 191.24
G2554 010 2000	Pugsley Wharf ABC Water Street	3 501 900	161 385.06
G2553 023 9000	Land & Shed Way to Wharf Courtenay Bay	49 100	2 262.77
G2553 013 1000	Courtenay Bay to Sugar Refinery	20 700	953.96
G2553 010 4000	Vacant Land Britain & Charlotte Streets	1 483 300	68 357.88
G2552 006 2000	Vacant Land Rodney Street	13 000	599.11
G2551 038 6000	Forest Products Terminal Saint John West	9 299 600	428 572.07
G2551 017 1000	Car Dumper Bldg. Union Street	256 800	11 834.63
G2551 016 2000	Grain Galleries Union Street	181 200	8 350.60
G2551 015 3000	Elevator H. E. Union Street	1 463 000	67 422.36
G2551 014 4000	All Land Bldg. Ward 1 G2551 066 1000 Also Dock Area West Saint John	4 320 000	199 087.20
G2502 588 3000	Elevator B 2 27 8 West Saint John	13 000	599.11
G2504 473 7000	CPR Grain Elevator	159 000	7 327.52
SUB-TOTAL		47 843 500	2 179 391.15
Other Properties (unspecified above)		1 377 900	21 703.85
TOTAL		$49 221 400	$2 201 095.00

Provincial government and the City of Saint John. However, it has been observed that financial flows in the form of increased property tax revenues "do not represent real flows and in particular should not be accounted among the benefits of a project".[1] It is claimed that these payments do not represent a claim on society's real resources and therefore, should not affect the social profitability of a proposed project.

While the British Columbia "Working Group on Benefit-Cost Analysis" maintains that property tax payments do not represent a claim on society's real resources and should not be included as external benefits resulting from a project, other analysts are not so adamant. For example, according to a study by C.D.I. Inc., "...for real estate taxes and business taxes, some of these taxes may correspond to the provision of some government services such as municipal services in the form of fire protection, etc. However, a good portion, estimated by most economists at one half of the taxes, does not correspond to the use of resources. Half of these taxes are consequently externalities".[2]

The Benefit-Cost Analysis Guide issued by the Federal Treasury Board Secretariat provides scanty treatment of this issue. It states that the treatment of taxes and subsidies which affect the costs to the producer (developer) "...is less clear-cut", with the proper treatment depending on whether or not the project's demand for inputs (such as municipal services) are met by creating new supplies, or by diverting them from other uses.[3]

Although it has been debated whether or not property tax payments should enter directly into a benefit-cost analysis, these revenues are extremely

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1 Province of British Columbia, Guidelines for Benefit-Cost Analysis, Environment and Land Use Committee Secretariat, 1977, p. 124.

2 Les Conseillers en Developpement Industriel, (Industrial Development Counsellors), Comparative Study of the Competitive Factors Between Moncton, N.B. and Kitchener, Ont. for a New Diesel Engine Manufacturing Facility, study conducted for Government of New Brunswick, 1980, p. 41.

3 Planning Board, Treasury Board Secretariat, Benefit-Cost Analysis Guide, Government of Canada, 1976, p. 17.

important to the provincial and municipal levels of government. Both levels of government, like a private corporation, must analyze the effects on cash flows of a proposed project. These tax revenues are therefore an important component of the overall analysis of a project.

It has been decided to follow the methodology of C.D.I. and many other economists and treat one-half of the annual property tax payments by Port facilities as a benefit. Following this methodology, the annual benefits to the Province from property tax payments by the Port of Saint John is estimated to be $1 101 000.

7.3 Motive Fuel Taxes

During discussions with the Client regarding progress on the study, the question arose as to whether or not payments of motive fuel tax to the Province as a result of port related activities might represent a substantial benefit. During follow-up discussions among the Study Team, it was decided that several possible sources of motive fuel tax should be addressed. These possible sources were as follows:

1). Fuel sales to ships - Fuel bunkering services to ships is provided by Atlantic Towing Limited, with three barges transporting for two major oil companies direct to the ship or berth, supplying quantities of Bunker C fuel oil of over 450 tonnes. Smaller quantities of Bunker C fuel, diesel fuel, and marine gas and oil are delivered directly to the piers by truck for various oil companies located in the Port area.

Based on discussions with the Supervisor, Gasoline and Motive Fuel Tax, for the Department of Finance, it was determined that vessels of over 300 tons gross mass are exempted from motive fuel tax in New Brunswick. This size of ship would include all major ocean-going vessels calling at the Port. Therefore, revenues to the Province from motive fuel taxes on sales of fuel to ships was not considered substantial, for purposes of this study.

2). Atlantic Towing Limited - this company operates a fleet of 22 tugs, 6 of which are devoted to service related to the Port of Saint John. However, it is claimed that most of the tugs are over 300 tons gross mass and therefore exempt from payment of motive fuel tax on fuel purchases.

3). Process Fuel and Heat - some of the warehouses for storage as well as the equipment used for loading and unloading cargoes, consume propane, gasoline, or diesel fuel. Such equipment includes payloaders consumption of propane, heating of enclosed conveyors, etc. However, discussions with the Supervisor, Gasoline and Motive Fuel Tax suggested that the total annual revenues to the Province were not substantial for our study purposes.

4). Truck and Rail Fuel - The many trucks and rail locomotives arriving at and exiting from the Port of Saint John each day certainly consume large quantities of fuel, and therefore, pay substantial annual motive fuel taxes. However, as in the case of the employment created by these commodity movements, these taxes are considered more directly related to the companies shipping or receiving the cargoes, than to the Port of Saint John. Therefore, no benefits to the Province have been calculated.

7.4 Impact on Economic Development

Although it would be very difficult, if not impossible, to quantify in dollar terms the impact of the Port of Saint John in stimulating the economic development of the Province, it nevertheless should be stated that the presence of the Port certainly creates a positive impact on economic development initiatives.

On the one hand, the inclusion of the Port of Saint John as a port of call by a number of world-wide shipping lines puts the City of Saint John, and indeed the Province of New Brunswick, on the international map where it

can be noticed by shipping companies around the world. This international exposure, supported by marketing efforts promoting port facilities, and New Brunswick's industrial capabilities can stimulate new markets for New Brunswick products. For example, this international exposure can benefit the Province through such complex interactions as a new shipping line calling at the Port on a scheduled basis, so as to bring inbound shipments of Korean auto parts destined for Quebec, and taking outbound shipments of New Brunswick beer and forest products.

On the other hand, the existence of a year-round deep-water port, which is a port of call for many world-wide shipping lines, acts as a positive stimulus for provincial economic development initiatives. If adequately promoted, the availability of these port facilities should act as a highly positive factor for companies desirous of ready access to international markets via water-borne shipping and/or similar access to a source of supply for their inbound materials. Although many Maritimers have long complained about the disadvantages of a plant location here as regards serving the major domestic markets in Ontario and Quebec, perhaps more attention should be focussed on attracting more companies with overseas markets for which port facilities would be a key asset.

7.5 Provincial Sales Tax

In New Brunswick a provincial sales tax of 11 percent is applied to all items purchased, with the following exceptions - clothing, footwear, foodstuffs, thermal insulation for buildings, electricity, prescription drugs, farm machinery, education supplies, heating fuel, machinery and parts used in the manufacture of goods.

According to Ports Canada officials, during the past year, purchases by the Port, within New Brunswick, totalled approximately $2 000 000, of which $198 000 represented non-taxable items including purchases of electricity and heating fuel. Therefore, it is assumed that $1.8 million per year in New Brunswick purchases would be subject to provincial sales tax as a result of routine port operations.

According to Ports Canada officials, the average capital expenditures by the Port over the past 10 years has been equivalent to approximately $9 417 000 per year. However, a large portion of these capital expenditures are for real estate purchases, engineering services, and other purchases which are not subject to Provincial sales tax. It is assumed that approximately 50 percent of the capital expenditures ($4 209 000) would involve payments of Provincial sales taxes.

In summary, it is estimated that, on an annual basis, the on-going operations at the Port of Saint John result in $1.8 million in purchases which are subject to Provincial sales taxes. Capital expenditures at the Port are assumed to involve $4 709 000 in annual expenditures which are subject to Provincial sales taxes. Therefore, a total of $6 509 000 of annual expenditures are estimated to be subject to Provincial sales taxes. At the present rate of 11 percent, these expenditures would result in annual Provincial sales tax revenues to the Province of approximately $716 000.

8.0 PROVINCIAL COSTS ASSOCIATED WITH PORT OF SAINT JOHN

In general, the Province of New Brunswick has not historically had a large financial involvement with the Port of Saint John. The Port has been operated largely by the federal government, formerly under the National Harbours Board, and more recently, under Ports Canada. Therefore, the common attitude toward the Port, until recently, has tended to be that it was a federal responsibility.

A major exception to the provincial hands-off attitude towards financial involvement with the Port involved the Province's investment in the Rodney Container Terminal (Brunterm). The Province considered investing in the Rodney Terminal in the early 1970's when it became apparent that the federal government could not be convinced to provide funds for such a facility at that time. When it was clear that the federal government could not be convinced to build the terminal, the Province decided to contribute substantial funds towards the project, with the idea that eventually, the Government of Canada would be convinced to contribute towards the costs of the project.

The provincial participation in Rodney Terminal was set up through the New Brunswick Transportation Authority, which advanced funds to National Harbours Board over a three year period 1972-73, 1973-74 and 1974-75. The total funds provided by the Province over the three year period was $25 192 638.

Subsequent to providing these funds, the Province was able to negotiate an agreement with the federal government whereby the Province would be entitled each year to a share of the any operating income of the terminal. This money was to be paid to the Province during each year the terminal had positive net operating income, and was intended to represent a means of repayment of the original $25.2 million principal advanced to the project. This agreement made no provision for the Province to recover interest on the $25.2 million.

As of January, 1986, a total of $5 283 818 had been paid back to the Province by National Harbours Board (now Ports Canada). The principal amount of loan outstanding is now $19 681 252. Although the Province had incurred substantial financial costs in carrying this large debt (interest costs are said to have amounted to approximately $21.3 million already), these costs should be considered a sunk financial cost and not relevant for benefit-cost analysis purposes. For benefit-cost analysis purposes, the relevant costs are those yet to be paid to the Province of $19 681 252.

Discussions with officials at both the Departments of Commerce and Technology, and Transportation revealed no other significant costs which have been borne by the Province regarding port facilities. Mention of port facilities in promotional literature and during ministerial and staff promotional tours are generally considered as minor incidental expenditures to general promotion of the Province.

9.0 BENEFIT-COST ANALYSIS

9.1 Introduction

This chapter will draw together the detailed analysis of benefits and costs contained in Chapters 3.0 to 8.0 inclusive, so as to provide a comparative analysis of benefits and costs. A time horizon of eleven years (base year 1986, plus ten future years) was arbitrarily selected for analysis purposes. As is normal practice in benefit-cost analyses, all future costs and benefits are expressed in terms of constant 1986 dollars.

9.2 Summary of Benefits

Table 9.1 presents a summary of each of the major types of benefits of the Port of Saint John identified in previous chapters. As well, the projected future value of these benefits (in constant dollars) has been estimated for each of the next ten years. Finally, the future value of these benefits has been reduced to their present value using a commonly accepted social discount rate of 10 percent. The detailed explanation of how each of these categories of benefits was determined is presented in previous chapters. However, an overview of the derivation of each type of benefits is presented in this section.

Benefits from Outbound Commodity Movements - This category of benefits was determined for all New Brunswick companies currently exporting cargo through the Port of Saint John. Benefits were based on the cost savings by the New Brunswick companies in shipping their cargo through Saint John as compared to the next best alternative port facility. Cost savings (net of inflation) were assumed to be similar in subsequent years to those savings estimated for 1986 ($22 134 000 per year).

Benefits from Inbound Commodity Movements - This category of benefits was determined for all New Brunswick companies currently importing cargo through the Port of Saint John. Often the cargo represented a key resource input for the consignee company. Benefits were based on the cost

Table 9.1

SUMMARY OF BENEFITS TO NEW BRUNSWICK ($1986 x 1000)

Year	Benefits from Outbound Commodity Movements	Benefits from Inbound Commodity Movements	Employment Benefits	Other[1] Benefits	Total Benefits	Discount Factor At 10%	Present Value of Benefits
1986	22 134	5 316	21 436	1 817	50 703	1.000	50 700
1987	22 134	5 316	18 186	1 817	47 453	.9091	43 100
1988	22 134	5 316	14 975	1 817	44 242	.8264	36 600
1989	22 134	5 316	11 724	1 817	40 991	.7513	30 800
1990	22 134	5 316	10 138	1 817	39 405	.6830	26 900
1991	22 134	5 316	8 629	1 817	37 896	.6209	23 500
1992	22 134	5 316	7 158	1 817	36 425	.5645	20 600
1993	22 134	5 316	5 843	1 817	35 110	.5132	18 000
1994	22 134	5 316	4 605	1 817	33 872	.4665	15 800
1995	22 134	5 316	3 482	1 817	32 749	.4241	13 900
1996	22 134	5 316	2 515	1 817	31 782	.3855	12 300

TOTAL PRESENT VALUE OF BENEFITS = $292 200

[1] Evaluated at 50 percent of total annual property taxes of $2 201 095 per year, plus Provincial sales tax payments of $716 000 paid at Port of Saint John facilities.

savings by the New Brunswick companies in receiving their cargoes through the Port of Saint John as compared to the next best alternative Port facility. Cost savings (net of inflation) were assumed to be similar in subsequent years to the savings estimated for 1986 ($5 316 000 per year).

Employment Benefits - This category refers to the benefits to the Province from the 1 328 person-years of employment in direct port related activities at the Port of Saint John during 1986. Although overall employment at the Port is assumed to remain constant in future years, the benefits to the Province associated with the employment are assumed to reduce significantly each year as a result of the general unemployment rate in the City of Saint John being reduced from the present rate of 14.5 percent to 8 percent at the end of the study period. This assumption has the effect of reducing the overall annual employment benefits from $21.4 million during 1986, to $8.6 million during 1991, and to $2.5 million during 1996. Should this assumption of a much improved unemployment rate in the Saint John area not materialize, then the future employment benefits associated with the jobs at the Port of Saint John would be considerably higher than projected.

Other Benefits

Property Tax Benefits - This category of benefits is based on the assumption that only 50 percent of the annual property taxes collected from Port of Saint John facilities are used by the Province to cover increased costs of provision of municipal services such as water, sewer, police and fire protection, as a result of port related activities. In other words, approximately one-half of the $2.2 million per year collected in property taxes (or $1.1 million) is assumed to be an on-going benefit to the Province.

Sales Tax Benefits - Based on annual on-going purchases of $1.8 million which are subject to the 11 percent rate of Provincial sales tax, and a portion of average annual capital expenditures of $4 709 000 also subject to Provincial sales tax, it is estimated that annual benefits to the Province of $716 000 accrue from Port operations.

Present Value of Benefits - When the four categories of benefits evaluated are added together, a total of $50.7 million in benefits are estimated to accrue to the Province during 1986, as a result of Port of Saint John related activities. When the estimated benefits during 1986, and the projected benefits for the following decade, are summed and discounted to their present value, using a social discount rate of 10 percent, the total present value of benefits is estimated to be $292.2 million.

9.3 Summary of Costs

As discussed in Chapter 8.0, the only relevant Provincial costs associated with the Port of Saint John activities involves the $19 681 252 outstanding principal still owing on the loan by the Province to the Port for construction of the Rodney Container Terminal (Brunterm).

9.4 Benefit-Cost Analysis

When the discounted present value of total Provincial benefits over the study period ($292.2 million) is compared to the discounted present value of total Provincial costs ($19.7 million), a benefit/cost ratio of 14.83 is determined. Expressed in another way, the Province is projected to realize a net present value of $272.5 million dollars in benefits from the Port of Saint John over the 1986 - 1996 period (in terms of constant 1986 dollars).

One may conclude from these study results that the Province of New Brunswick derives very substantial annual benefits from the activities conducted at the Port of Saint John. The total benefits projected to be derived by the Province over the study period accrue to various groups as follows:

- approximately 54 percent of the benefits accrue to New Brunswick companies shipping cargo outbound through the Port;

- approximately 29 percent of the benefits are realized by the Provincial economy as a result of employment benefits associated with jobs at the Port;

- approximately 13 percent of the benefits are realized by New Brunswick companies receiving cargo inbound through the Port; and

- approximately 4 percent of the benefits are realized by the Provincial and municipal governments as a result of property taxes and sales taxes paid by port facilities.

Based on a review of the non-liquid bulk types of cargo being shipped through the Port during 1985, which had an origin or destination in New Brunswick, it was concluded that approximately 11 percent of the cargo was shipped in containers, 52 percent was in break-bulk, and 37 percent was in the form of dry-bulk shipments. The benefits to New Brunswick companies could be said to be roughly proportional by cargo type to these percentages. However, the benefits associated with certain types of port related employment are more difficult to assign to a particular type of cargo.

It is important to further emphasize that no benefits have been calculated for the single largest commodity movement through the Port - the large quantities of liquid - bulk movements of petroleum products by the Irving companies through private facilities. As stated in previous chapters, the probable single most significant benefit of these petroleum shipments is the 425± jobs at the Irving Oil refinery. The benefits associated with these jobs have not been included in the benefit-cost analysis calculations.

10.0 SENSITIVITY ANALYSIS

10.1 Introduction

The future is always uncertain and events rarely turn out precisely as forecast. For this reason, sensitivity analysis on the variables involved in an economic analysis, incorporating assumptions about the future, are useful to show decision-makers which "uncertain" factors would be most liable to affect the results of an economic study.

This chapter tests the impact on benefit-cost results of changes in the magnitude of several key variables used in evaluating the economic return to the Province from the activities conducted at the Port of Saint John.

Since the basic benefit-cost analysis showed the activities at the Port of Saint John to have a substantial net present value of benefits in excess of costs, the sensitivity analysis will focus particularly on the "downside risk" (ie. what type of changes in the magnitude of key variables would have a serious negative impact on the results of the benefit-cost analysis.

10.2 Changes in Cost

The only Provincial cost identified as being directly related to Port activities was the $19.7 million outstanding principal owned the Province as a result of funds loaned to the Port between 1972-74 for the construction of the Rodney Container Terminal (Brunterm). No on-going economic costs to the Province were identified. For purposes of sensitivity analysis it was decided to test the impact on analysis results should the Province become involved in supporting a major project at the Port with a $50 million capital cost, and on-going annual costs to the Province of $5 million per year from 1987 - 1996. Under such a scenario, if the total present value of benefits remained at $292.2 million (realistically one would expect a major capital investment to increase the magnitude of these benefits), the total present value of costs would

increase to $97.6 million, and the benefit/cost ratio would be reduced to 2.99. Therefore, it would appear that the Province could increase its' level of investment in Port activities substantially, if such investment were considered socially desirable, and still experience a positive economic return from port activities.

10.3 Impact of Reduced Employment Levels

Although the Port remains a major source of employment in the Saint John area with an estimated 1 328 person-years of direct employment, it was noted in Chapter 3.0 that the levels of employment provided in many of the port related services have exhibited a downward trend since 1969. As more and more of the total cargo tonnage is composed of dry-bulk materials such as potash, or in the form of containerized freight, and less in the form of break-bulk cargo, the number of jobs for stevedores and other freight handlers has declined substantially. Therefore, it would appear useful to assess the impact on analysis results of an immediate substantial reduction in employment at the Port over the duration of the study period.

If the level of employment at the Port was immediately reduced by 30 percent and this reduced level of employment were sustained for the duration of the study period, the impact on analysis results would be to reduce the total present value of benefits to $267.2 million (from the estimated $292.2 million in the base analysis) while the total present value of costs remained at $19.7 million. Therefore, the overall benefit/cost ratio would be reduced to 13.56, indicating the Province would continue to enjoy substantial net benefits from port activities.

10.4 Impact of Reduction in Employment Benefits

The level of benefits associated with employment at the Port were based on the assumption that the existing unemployment situation in Saint John improves steadily from the present 14.5 percent unemployment rate, to an 8 percent unemployment rate in 1996. A recent federal task force on labour

market development in Canada[1] supported the contention that society realizes considerable benefits from permanent job creation in labour markets characterized by high unemployment levels. In fact, initial social gains of approximately 60 to 80 percent of the wage bill were considered realistic. However, over a period of years, it was argued that the long term social gains from permanent employment would typically be in the range of 10 to 15 percent. In order to assess the impact on analysis results of a highly conservative estimate of employment benefits, the on-going benefits associated with employment at the Port was reduced to 10 percent of the wage rate. The impact on analysis results was to reduce the total present value of benefits over the study period to $236.7 million (from $292.2 million in the base analysis) and the benefit/cost ratio to 12.02 (from 14.83). Therefore, one can conclude that even under highly conservative estimates of the benefits from employment at the Port, the economic benefits to the Province associated with port activities remain highly favourable.

10.5 Impact of High Interest Rates

The basic analysis assumed a discount rate (interest rate) of 10 percent which was applied to all future benefit and cost streams to reduce them to their present values. The 10 percent discount rate has been commonly accepted as the appropriate social discount rate for economic assessment of government projects by the Government of Canada. Based on empirical research, it is claimed that this discount rate approximates the long run average return on investment (private and government) in the Canadian economy (net of inflation).

It was decided to test the impact on analysis results of a much higher discount rate. If all future benefit and cost streams are discounted to their present value by using a discount rate of 20 percent, the present value of benefits is reduced to $220.3 million and the benefit/cost ratio is reduced to 11.18, indicating the net benefits to the Province remain highly positive.

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1 Employment and Immigration Canada; Labour Market Development in the 1980's, Report of the Task Force on Labour Market Development, July, 1981, pp. 117 - 118.

10.6 Impact on Employment of Marginal Increases in Cargo Volumes

During 1985, a total of 8 662 000 metric tonnes of cargo passed through the Port of Saint John. After excluding liquid petroleum products (for which no benefits were calculated), total benefits amounted to 2 664 000 metric tonnes[2].

If 2 664 000 metric tonnes of cargo were responsible for 1 328 person-years of employment at the Port, it is of interest to Provincial officials to be able to estimate the impact on employment levels of marginal increases in the level of Port traffic.

Based on a review of the data contained in Table 3.1, it is estimated that approximately 700 person-years of employment at the Port would fluctuate directly with the level of Port traffic. Viewed in this manner, a guideline for Provincial officials would be that on an annual basis, one additional person-year of employment might be anticipated from each additional 3 800 metric tonnes of traffic stimulated at the Port, assuming the increased cargo traffic consisted of a similar breakdown of cargo types as at present. In other words, a five percent increase in Port traffic (133 200 metric tonnes) could be expected to generate approximately 35 incremental person-years of employment at the Port.

Based on a review of overall Port traffic by type, it was concluded that approximately 31 percent of existing cargo volume (excluding petroleum products) consists of containers, 36 percent is in the form of break-bulk and 33 percent in in the form of dry-bulk[3]. On the other hand, in a review of the relative employment generated by various types of Port traffic, the Masterplan study concluded that per tonne of cargo traffic, containers were only 38 percent as labour intensive as general break-bulk cargo, and dry-bulk cargo was only 19 percent as labour intensive as break-bulk cargo.[4].

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2 & 3 Ports Canada; Annual Traffic Report, 1985, Port of Saint John, February 11, 1986.

4 Fenco Consultants, Ibid, p. 5.14.

From these statistics it can be concluded that:

1). A general increase in cargo traffic (31 percent containers, 36 percent break-bulk, and 33 percent dry bulk) could be expected to generate one incremental person-year of employment for each additional 3 800 metric tonnes of cargo handled.

2). An increase in container traffic only could be expected to generate one incremental person-year of employment for each additional 5 400 metric tonnes of cargo traffic.

3). An increase in dry-bulk cargo only could be expected to generate one incremental person-year of employment for each additional 10 900 metric tonnes of cargo traffic.

4). An increase in break-bulk cargo only could be expected to generate one incremental person-year of employment for each 2 100 metric tonnes of cargo traffic.

It is important to realize that these estimates of increased employment are rule-of-thumb guidelines only. The estimates make no allowance for the impacts of future technological change. Furthermore, no allowance is made for a thresh-hold being reached where the relatively "fixed" component of overall employment at the Port would also increase.